

SOUTH DAKOTA

Statewide Communications System

Joint Committee on Appropriations

January 25, 2017



**BUREAU OF INFORMATION
AND TELECOMMUNICATIONS
STATE OF SOUTH DAKOTA
BIT.SD.GOV**



History

1940 - 2003

Statewide Lowband System (39MHz)

- Dispatch to car communications primary, car to car limited to 10 miles or less 70-75% coverage, very prone to interference, limited equipment availability.

1970-2003

Forestry Highband System (150MHz)

- Dispatch to car, car to car over coverage of a single site. Black Hills area only.

1940

2003

1970 - 2003

DOT Highband System (150MHz)

- System used by DOT only, 22 sites, dispatch to car, car to car over coverage of a single site. 75-80% coverage.

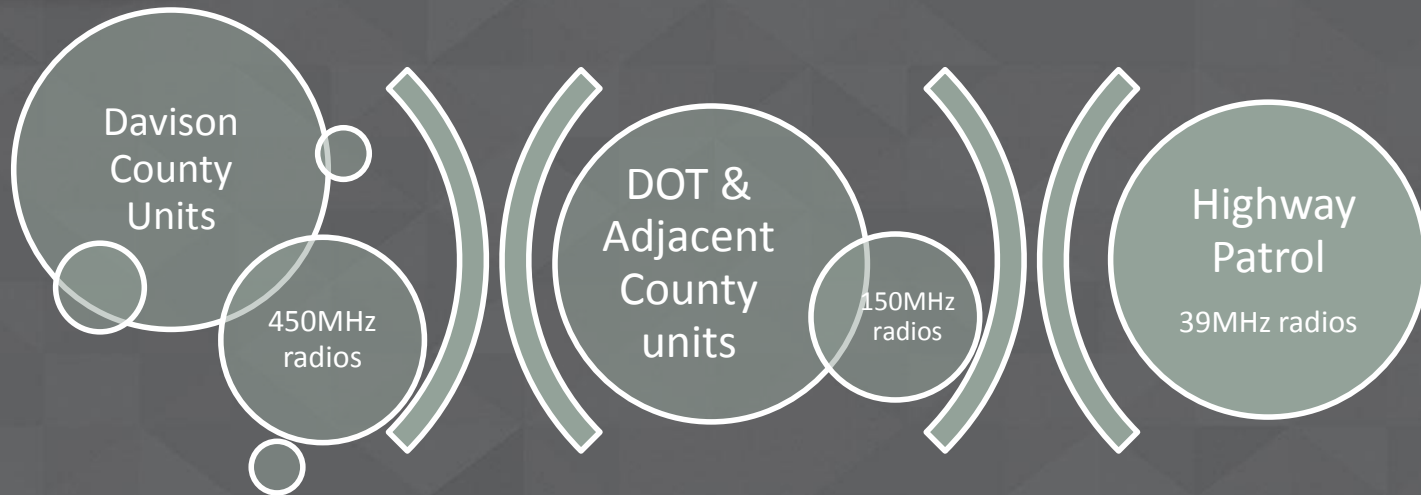
1980 - Present

Deployable UHF (450MHz) and VHF (150MHz)

- system for interoperability during events and disasters.

Local agencies began migrating off of Lowband in 1960's and 1970's because system no longer met their needs. Agencies operated on UHF and VHF without any coordination. State/local/federal/tribal communications were problematic at best, and in many cases no radio communications existed between the groups.

The Tipping Point, Spencer Tornado



1998



Result?

No coordinated communications. Governor Janklow ordered a deployable system in and handed out radios. This is the lowest level of emergency interoperability as currently defined by DHS.



Decision to Upgrade

Legislative action in 1999. HB1292 directed the 8 state agencies using radio communications to integrate into a common system, initial scope was expanded by the Governor to include local agencies.

1999 - 2000
Decision process

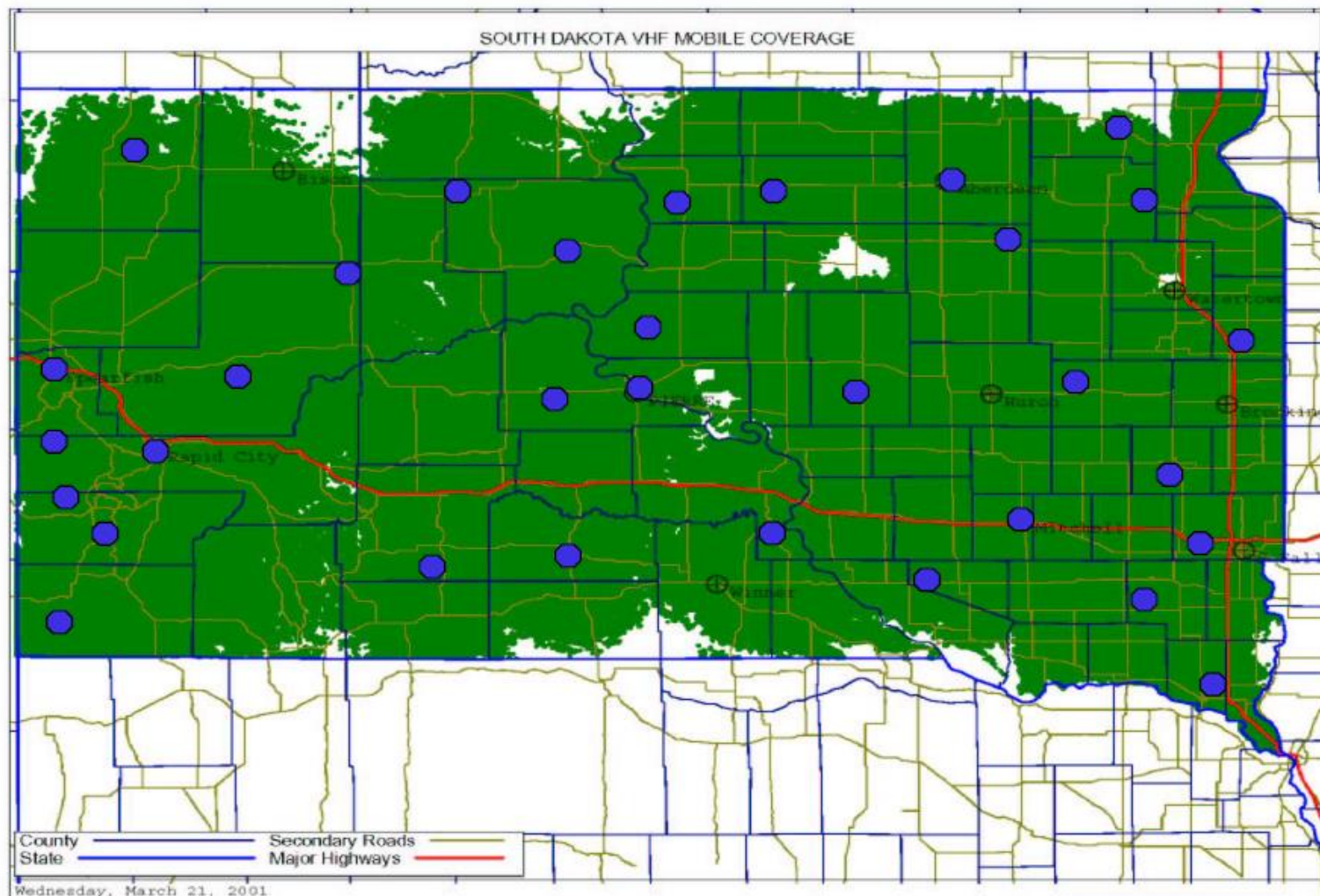
2000 – 2002

- System design
- built master site & first 5 sites for testing

2002 – 2003
Finish buildout of
initial 35 sites

System was designed to provide the maximum area coverage with the minimum of sites. Vendor claims that we are still the only entity to request a budget-based system, as opposed to an objectives-based system.

State Radio Sites – 2003 (35)





Expanded Via Grants

- Corson
- Charles Mix
- Baltic
- Perkins County (DHS Funds)
- SF Simulcast (3 sites, local funds)
- Watertown
- Brookings
- Huron
- Yankton (CDBG funds)

2003 - 2004

- Wall
- Winner
- Butte County
- Beresford
- Herreid
- Orient
- Sturgis (DHS funds)

2005 - 2007

- Porcupine & Pine Ridge (BIA funds)
- RC Simulcast (3 sites, local funds)

2008 - 2013

- McPherson County (Local/DHS/SRC project)

2014

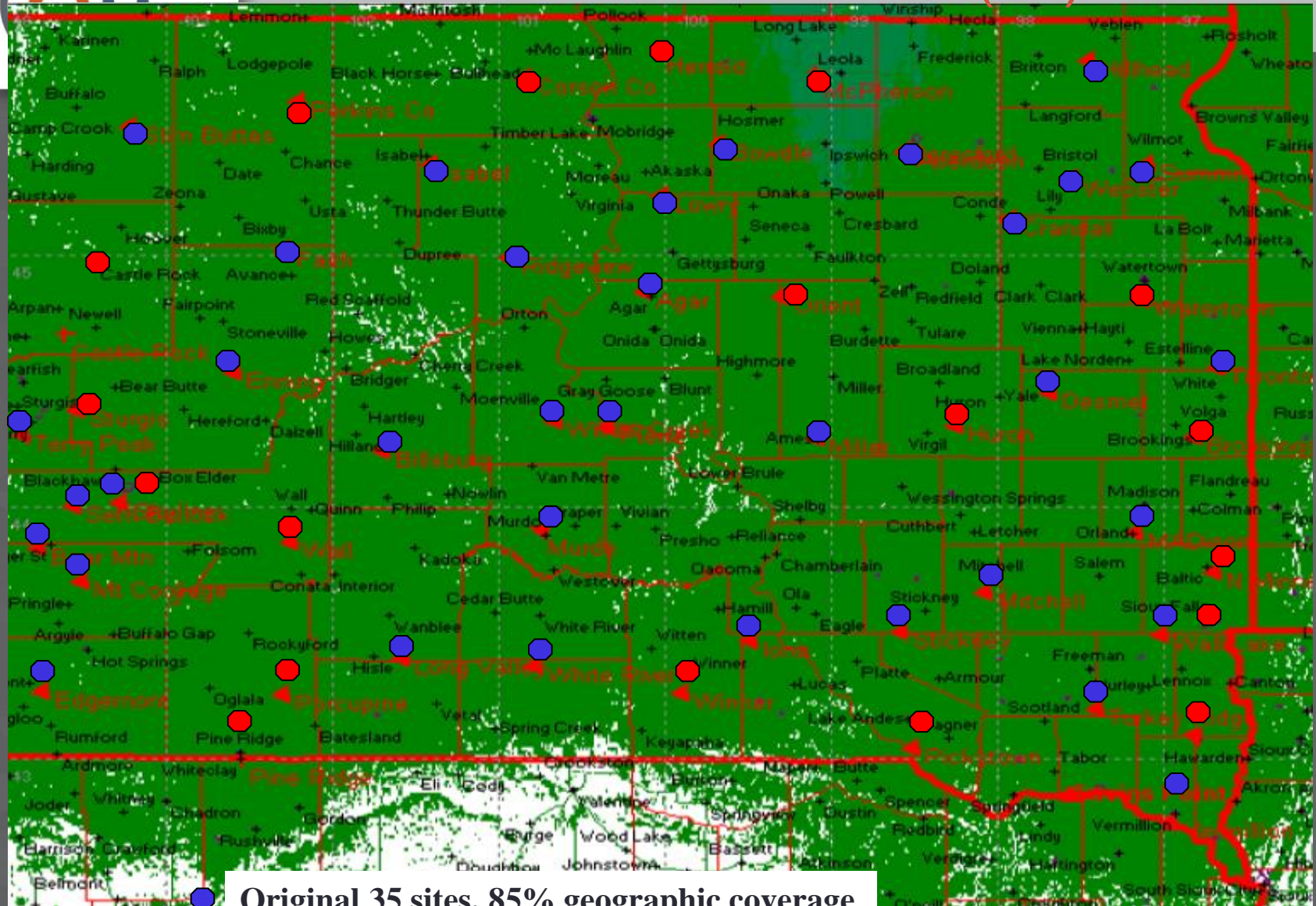
Sites Relocated for Better Service

Murdo, from I-90 site in Murdo to site north of town

Yankton County site from Gayville to Corps site by Yankton

Pierre, from old DCI building to Mickelson building

State Radio Sites – 2017 (57)



● Original 35 sites, 85% geographic coverage

● Additional 22 sites, appx. 98% geographic coverage.



Factors Affecting Coverage

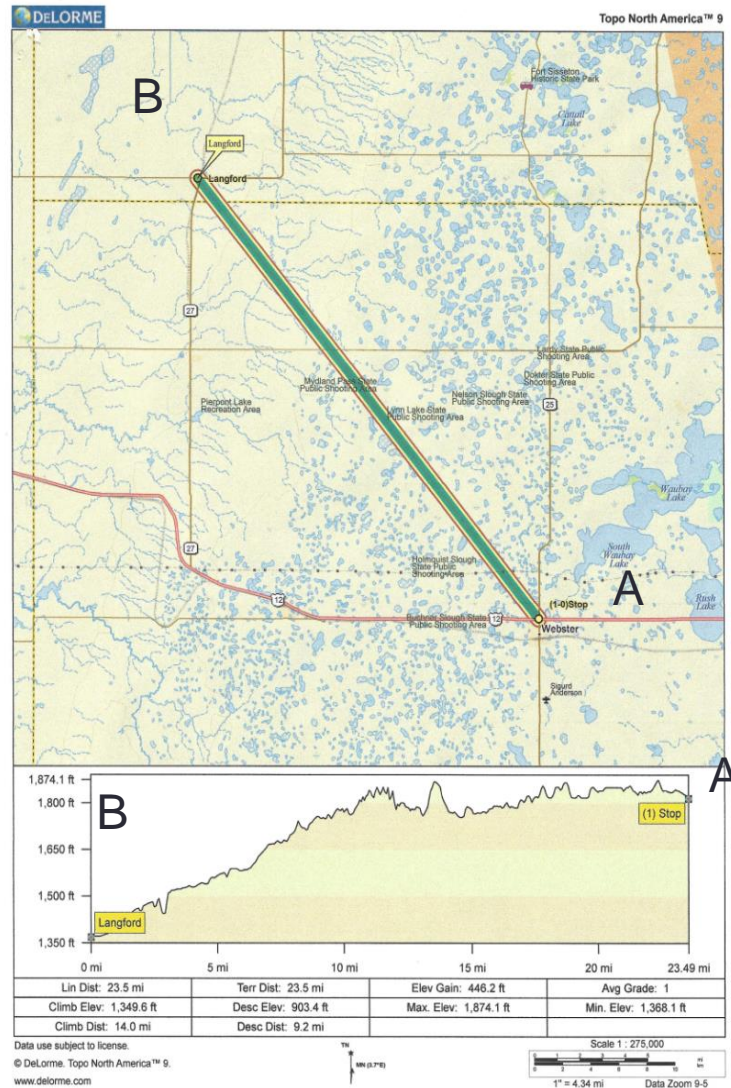
Topography -- Radio waves do not sharply bend around hills or valleys.

Site – equipment issues, antenna connections.

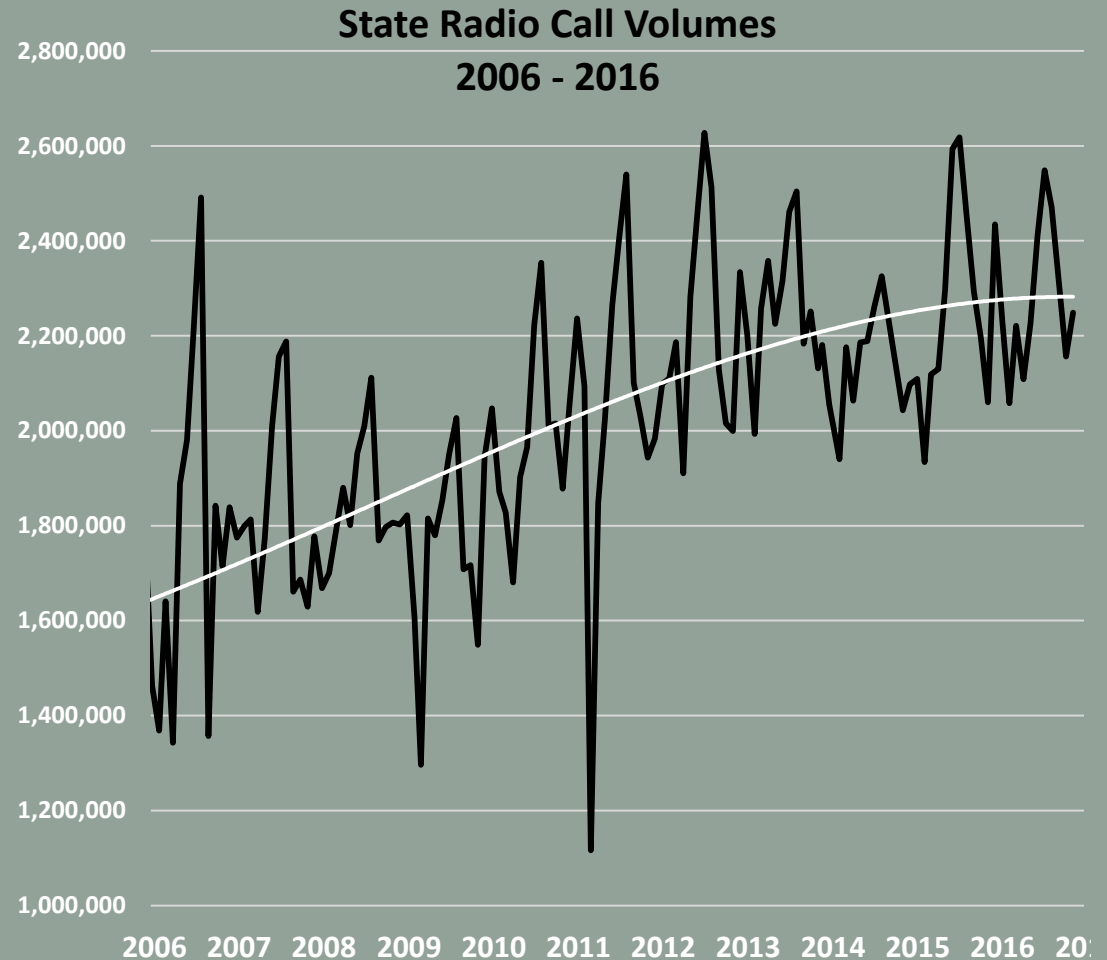
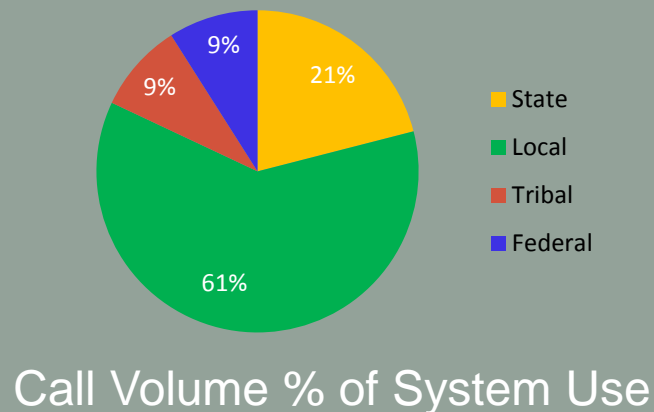
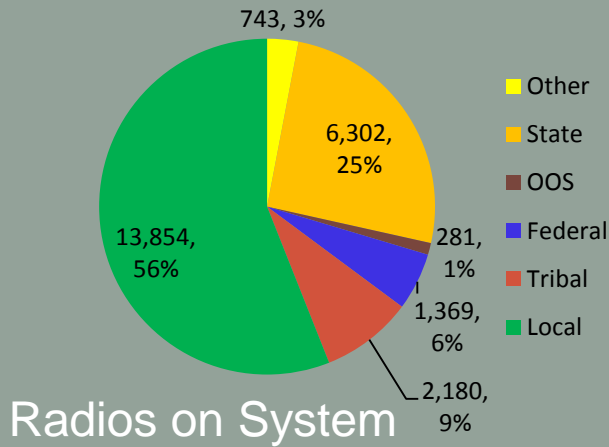
Radio type -- Portable 5 watts, mobile radio 45 watts + external antenna.

Subscriber condition – big factor. We manage around 1/3rd of radios on the system. Condition and maintenance of the 2/3rd are outside of our control.

Topography Example



System Usage





Factors Affecting Further Buildout

DHS grant funds are 1/10th of what they were at peak

Required system updates

Additional ongoing costs related to required system updates

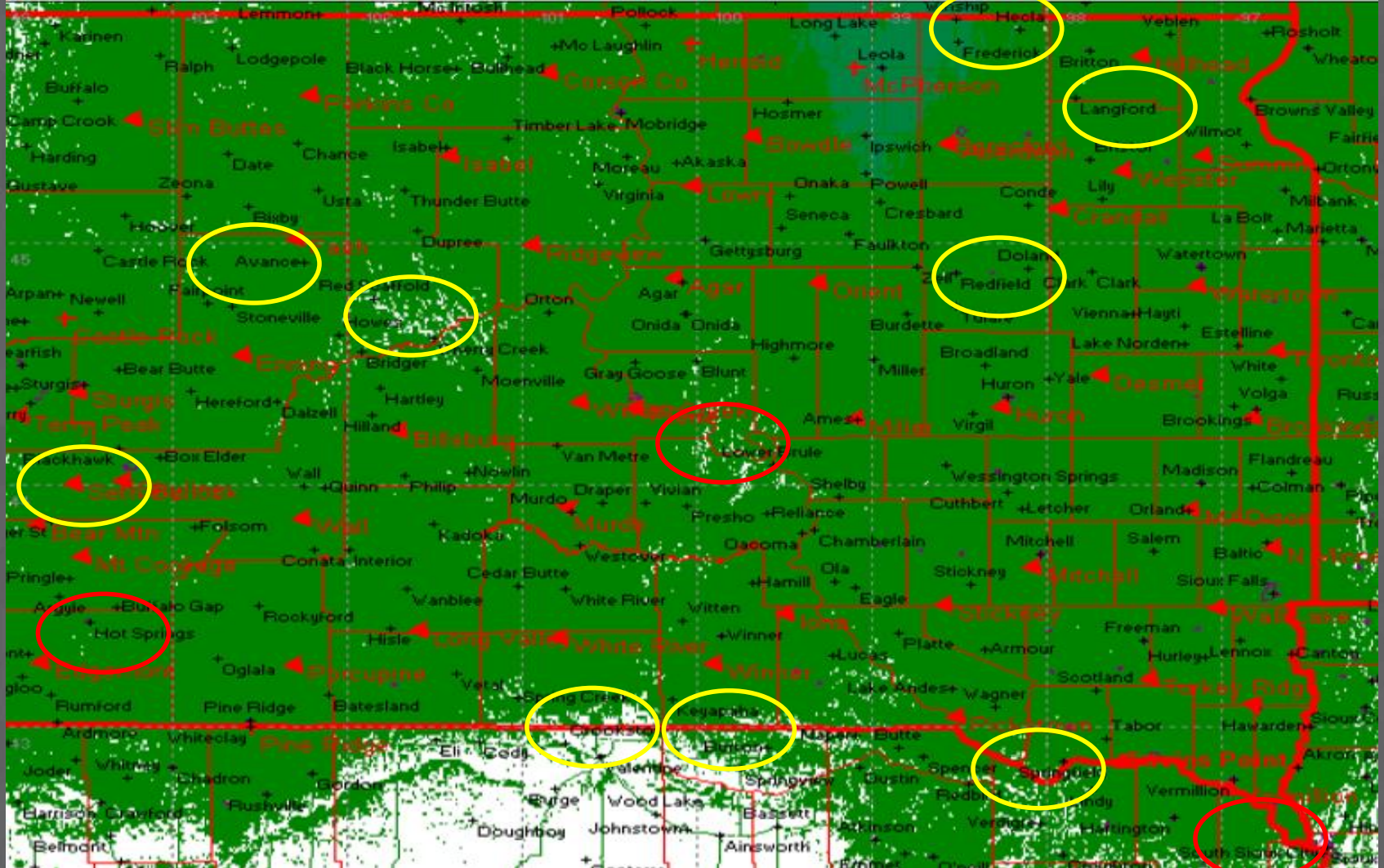
Coverage area investment. The McPherson County site turned up in 2014 covers approximately 1200 sq. miles, the proposed site in Union County will cover approximately 200 sq. miles. Outside of tower, site costs are the same



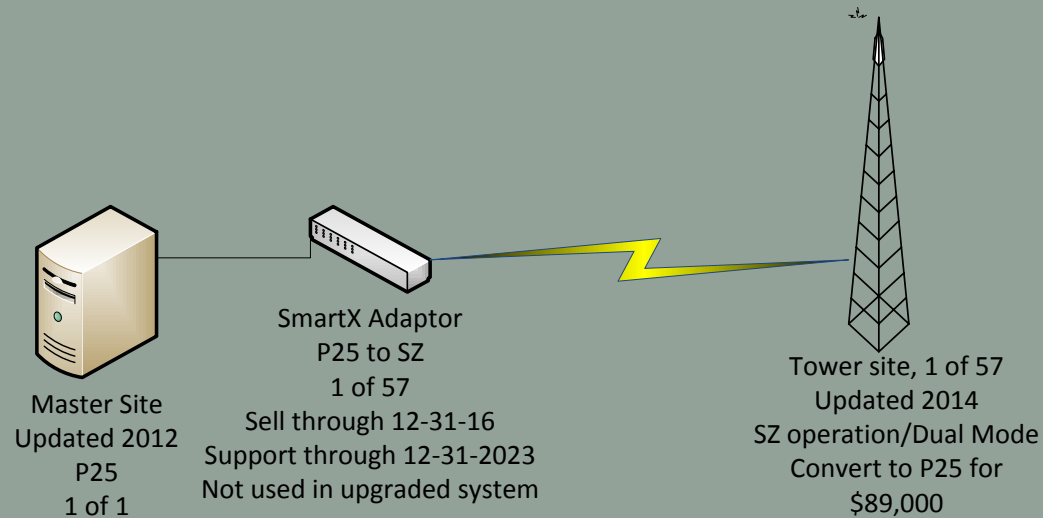
SDPSCC Designated Priority Sites

1. Southern end of Union County <200 Sq. miles
 - HIDTA route, I-29, lots of commuter traffic
 - County tower in place, equipment quote, frequency study completed
 - \$350K
2. Northern Lyman County
 - Area north of I-90 underserved
 - Reliance SDPB tower
 - \$350K
3. Fall River County
 - Problematic areas along Hwy 18
 - Battle Mountain tower
 - \$350K

Priority and Identified Underserved Areas



Radio Network Operating System



SZ = Smartzone Operating System, Motorola Proprietary
P25= Project 25, Industry standard for foreseeable future



Radios:
1 of appx 25,000
radios currently on SZ
Will need to be upgraded
to P25 or replaced with
P25 compliant radio

END OF LIFE



Radio Network Operating System (Project 25)

Project 25 [P25]

Addresses a lack of system interoperability between vendors

Standard is reviewed annually

Equipment is subject to acceptance testing by an independent lab

Compatibility is limited to subscriber equipment, infrastructure is proprietary

National standard for public safety communications

Industry has support contracts that are 20+ years out

P25 for the frequencies in use by South Dakota was still in development at procurement time.

Compatible Radios



Motorola
XTS/XTL Series Radio
Out of production
* * P25 flash until 12-31-17
Support until 12-31-2019



EF Johnson 53SL
Sell through 3-15-17
Support ends 10-15-22



Motorola
APX Series Radio
Current production



Kenwood TK Series Radio
Current production



EF Johnson Viking
Current Production



Lifecycle Guidance Provided By Vendor

2011 Vendor Recommendation

Update network controller to P25 (Completed 2012)

Update Quantar repeaters at sites (Completed 2014)

2013 Vendor Lifecycle Meeting Guidance

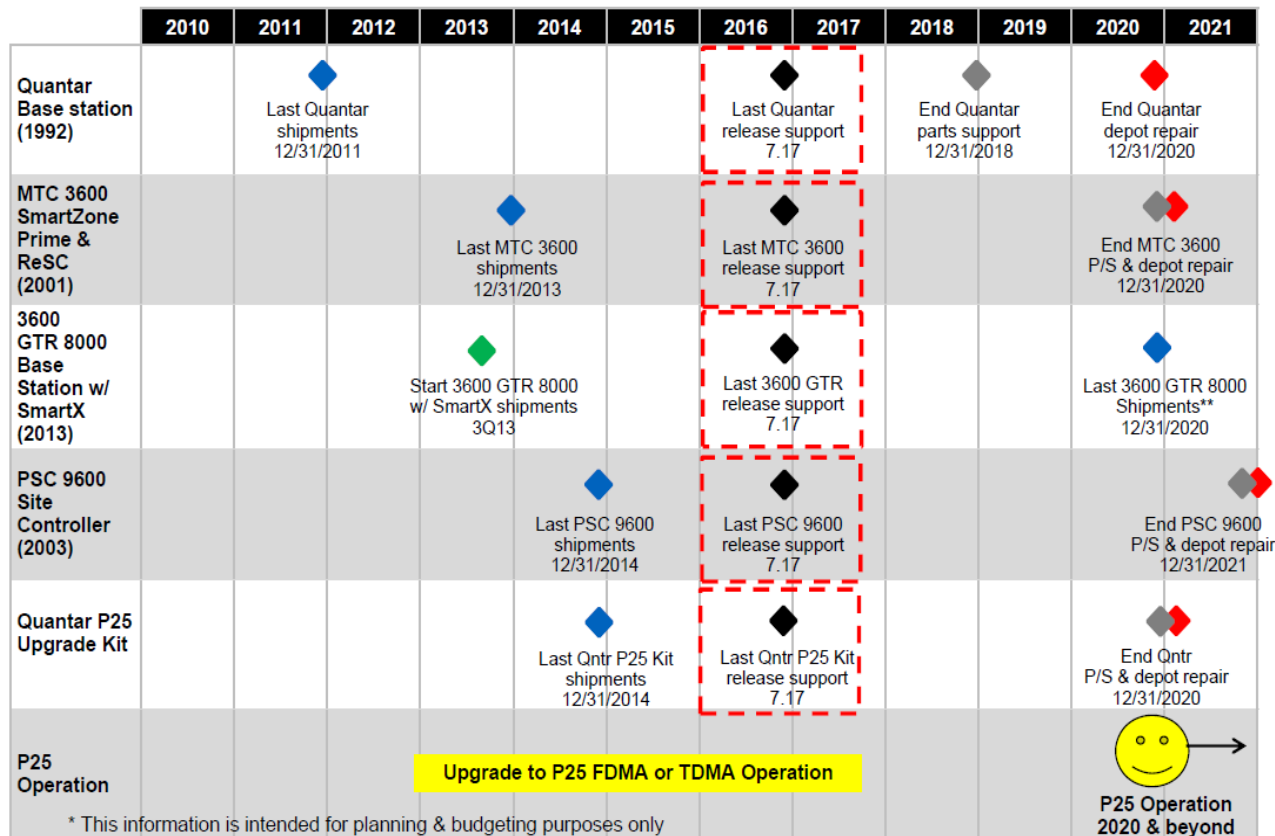
With above upgrades system will be supportable through 2025

March 10, 2016

Majority of radios on the system, if not upgraded by the end of 2017 to P25, will not have support offered and need to be replaced

System Components - Life Expectancy

SMARTZONE STATION MIGRATION via SMARTX LIFECYCLE

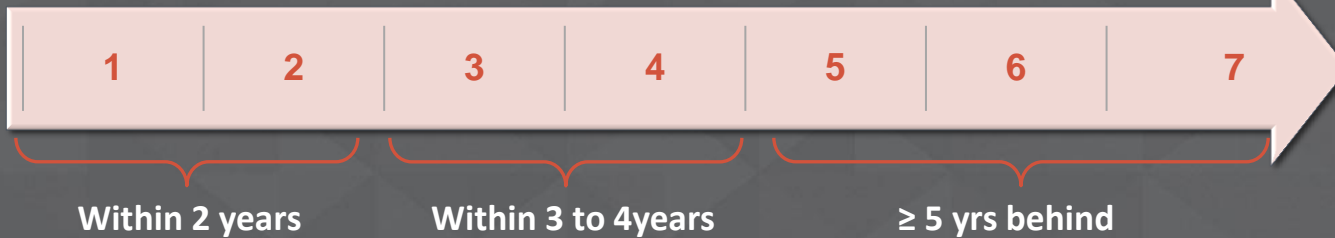


Radio System Complexity



Lifecycle planning must take into consideration the trade-offs associated with elapsed-time between system updates

Years between system upgrades



Support
and
Maintain

Expansion
and
Enhanceme
nt

**Lifecycle
Management**

Security &
Information
Assurance

Technology
Refresh

Green Zone

- Maximum access to expansion products
- Complete AV and third-party SW patch support
- Complete service and technical support

Yellow Zone

- Increased cost of expansion due to incompatibilities
- Limitations on AV and third-party SW patch support
- Limitations on support from third-party OEM

Red Zone

- Limitations on access to expansion
- No AV and third-party SW patch support
- Limited support from third-party OEM

As time elapses between upgrades:

- Decreasing level of serviceability and supportability
- Increasing costs to implement new features or expand system



Current Options

[OPTION 1] : Stay Current Path

Benefits

1. Utilize current functional system & radio configurations
2. Upgrade radios over next 5-7 years
3. Maintain current budget
4. Allows us time to see where industry is heading

Risks/Issues

1. Non-supported component in system fails, puts network at risk
2. No idea of cost to upgrade network and radios in future
3. If industry has no other options, where are we?
4. Continue to have spotty coverage in certain areas



Current Options

[OPTION 2] : Update System and Radios (\$21,599,379)

Benefits

1. Leverage current radios until normal replacement
2. Vendor responsible for radio updating and programming
3. System standards-based
4. Future programming will be possible over-the-air
5. System will have full product and software support
6. A plan to gradually fill coverage problems

5-19-2016 Quote
\$21,599,379 OR
If financed for 7 years
\$3,085,625 annually

Breakdown

1. Upgrade 16,000 radios: \$10,078,509
2. Upgrade sites & balance of network: \$4,988,565
3. Add electronics for 12 sites: \$1,729,154
4. Civil and materials for 12 new tower sites: \$4,803,093



Miscellaneous

- State Investment to date: \$65M (radios + sites, including grant funding) (North Dakota was just quoted over \$140M for a statewide system)
- Local agencies investments: Sioux Falls/Minnehaha County and Rapid City/Pennington County have made significant investments
- Since 2010: \$13M invested in upgrades
- Maintenance challenges
 1. Staff of 10.
 2. Technical staff is aging
 3. Lack of qualified applicants
 4. Ever-changing group of skillsets (RF vs IP)
 5. Aging tower infrastructure

Bowdle 2010 F4 Tornado



Christmas Day Storm 2016

